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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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22917	7590	09/20/2005	EXAMINER	
MOTOROLA, INC. 1303 EAST ALGONQUIN ROAD IL01/3RD SCHAUMBURG, IL 60196			FAN, CHIEH M	
			ART UNIT	PAPER NUMBER
			2638	

DATE MAILED: 09/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/903,175

Applicant(s)

BAUM ET AL.

Examiner

Chieh M. Fan

Art Unit

2638

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 July 2001 and 04 February 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-30,33,35,36,38,42-74 and 81 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-30,33,35,36,38,42-47,53,55-74 and 81 is/are rejected.
- 7) ☒ Claim(s) 48-52 and 54 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Claim Objections***

1. Claims 6, 11, 12, 19, 24, 25, 49, 50, 51, 52, 54, 64-67 and 69, are objected to because of the following informalities: each variable in the mathematical expression in each of the above-identified claims needs to be defined. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 14-26 and 57-69 are rejected under 35 U.S.C. 112, first paragraph, as being a single means claim. See MPEP 2164.08(a). The claim(s) contains only a transmitting device (claims 14-26) or a receiving device (claims 57-69).

### ***Claim Rejections - 35 USC § 101***

4. 35 U.S.C. 101 reads as follows:

Art Unit: 2638

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 29, 30, 33, 35, 36, and 38 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The above-identified claims are directed to a computer program for forming a sequence, i.e., a signal.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1-6, 8, 12, 14-19, 21, 25, 27, and 28 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee (U.S. Patent No. 6,373,861).

Regarding claims 1, 14, 27, Lee teaches a method comprising: providing at least one spread sequence portion (101 in Fig. 1, col. 1, lines 44-46); providing a cyclic redundancy (col. 2, lines 5-7); and forming a transmitted sequence based on an

Art Unit: 2638

arrangement of the spread sequence portion and the cyclic redundancy (105 in Fig. 1, col. 2, lines 1-17).

Regarding claims 2-4, 15-17, Lee teaches that the spreaders 101 spread the transmission signal using orthogonal codes and PN spreading sequences (col. 1, lines 40-43). Therefore, the spread sequence portion clearly reads on the claimed "a fraction of a spread sequence", "a spread sequence" or "concatenated spread sequences" (orthogonal code concatenated by PN spread sequence).

Regarding claims 5, 6, 18, 19, the output of the summer 102 of Lee meets the claimed "baseband chip-level sequence".

Regarding claims 8, 21, Lee teaches that the forming comprised inserting cyclic redundancy to the spread sequence portion for at least one symbol boundary (col. 2, lines 5-10).

Regarding claims 12, 25, Lee teaches cyclic prefix (col. 2, lines 5-8). The claimed mathematical is inherent for cyclic prefix.

Regarding claim 28, since Lee teaches the cyclic redundancy as explained above in the reason for rejection of claim 27, Lee inherently teaches a means for generating the cyclic redundancy.

8. Claims 42-44, 47, 53, 55-59, 62, 68, 70-72, and 81 are rejected under 35 U.S.C. 102(b) as being anticipated by Xing et al. ("The Performance Evaluation of the Multi-carrier CDMA System with Frequency Domain Equalization", IEEE paper, Sept. 1999; hereinafter "Xing")

Regarding claims 42, 55, 57 and 70, Xing teaches a method of operating a communication apparatus, comprising: converting a plurality of receive samples from at least one spread sequence into a plurality of frequency domain samples (DFT in Fig. 2 and PN sequence in Fig. 1 or 2); and determining an equalized signal (subcarrier equalizer in Fig. 2) based on the frequency domain samples. Note that Xing teaches simulation of the system in section 3.3, which inherently teaches computer program because it is known simulation representing the real world by a computer program.

Regarding claims 43, 56, 58 and 71, Xing also teaches determining a plurality of frequency domain equalization weights for the frequency domain samples (equation 3-1); and determining a time domain signal estimate based on the frequency domain equalization weights and frequency domain samples (symbol slicer in Fig. 2).

Regarding claims 44, 59 and 72, the receive samples include cyclic redundancy (adding GI in Fig. 1).

Regarding claims 47, 62 the receive samples comprise chip-space samples (inherent for CDMA signal taught by Xing).

Regarding claims 53, 68 and 81, Xing teaches removing the cyclic redundancy before converting to frequency domain samples (removing GI in Fig. 2).

9. Claims 42, 43, 46, 47, 55-58, 61, 62, 70, 71 and 74 are rejected under 35 U.S.C. 102(b) as being anticipated by Thielecke et al. (U.S. Patent No. 5,719,899, "Thielecke" hereinafter).

Regarding claims 42, 55, 57 and 70, Thielecke teaches a method of operating a communication apparatus, comprising: converting a plurality of receive samples from at least one spread sequence into a plurality of frequency domain samples (113 in Fig. 9 and 115 in Fig. 9); and determining an equalized signal (114 in Fig. 9) based on the frequency domain samples. Note that Thielecke teaches that the method may be performed in an ASIC or DSP (col. 7, lines 56-61), which meets the claimed computer readable code.

Regarding claims 43, 56, 58 and 71, Thielecke also teaches determining a plurality of frequency domain equalization weights for the frequency domain samples (120 to 114 in Fig. 9); and determining a time domain signal estimate based on the frequency domain equalization weights and frequency domain samples (output of 115 in Fig. 9).

Regarding claims 46, 61, and 74, Thielecke teaches receiving the receive samples at a plurality of receiver branches (col. 5, line 51, i.e., RAKE receiver).

Regarding claims 47 and 62 the receive samples comprise chip-space samples (inherent for CDMA signal taught by Thielecke, see col. 4, line 1).

### ***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 7 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (U.S. Patent No. 6,373,861) in view of Letaief et al. (U.S. Patent No. 5,960,032, "Letaief" hereinafter).

Lee teaches the claimed subject matter, as applied to claims 1, 14 above, but does not particularly indicate that the transmission data (TX data in Fig. 1) input to the spreaders (101 in Fig. 1) is from the same user (i.e., multicode CDMA). Letaief teaches a multicode modulation system (Fig. 1). The transmission data of a single user is divided a plurality of sub-block ( $b_k(t)$  in Fig. 1) and each sub-block is spread by a respective spreader. Letaief also teaches that the multicode modulation system has the advantage of ability to use interference cancellation as an effective technique for improving the overall system performance (col. 2, lines 8-10) and increase data rate (col. 2, lines 29-30, note that the advantage of high data rate is also admitted by the applicants, see page 1, lines 26-29 of the specification). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to divide the data of a single user to be the transmission data of Lee, so as to achieve the advantages identified above.

12. Claims 9, 10, 22, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (U.S. Patent No. 6,373,861) in view of Thomas et al. (U.S. Patent No. 6,826,240, "Thomas" hereinafter).



Regarding claim 9, 22, Lee teaches the claimed subject matter, as applied to claims 1, 14 above, but does not teach that the cyclic redundancy comprises zero value chips. Thomas teaches zero-value cyclic redundancy to avoid inter-carrier interference caused by time-varying channels (col. 12, lines 16-23). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use zero-value cyclic redundancy so as to avoid interference.

Regarding claims 10, 23, the zero-value cyclic redundancy taught by Thomas is a known sequence.

13. Claims 11, 13, 24, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (U.S. Patent No. 6,373,861) in view of Barton et al. (U.S. Patent No. 6,449,246, "Barton" hereinafter).

Regarding claims 13, 26, Lee teaches the claimed subject matter, as applied to claim 1 above, but does not teach inserting the cyclic redundancy as a cyclic prefix and a cyclic postfix to the spread sequence portion. Barton teaches that practical OFDM technique always includes a guard interval to remove intersymbol interference (ISI). The guard interval is composed of cyclic prefix and cyclic postfix samples (col. 4, lines 41-48). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to insert the cyclic redundancy as a cyclic prefix and a cyclic postfix to the spread sequence portion of Lee, so as to remove ISI.

Regarding claims 11, 24, the claimed mathematical expression is inherent for cyclic postfix.

14. Claims 29, 30, 33, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (U.S. Patent No. 6,373,861) in view of Chen et al. (IEEE paper, "A Programmable Architecture for OFDM-CDMA").

Regarding claim 29, Lee teaches an OFDM-CDMA system the performs the step of forming a sequence based on an arrangement of the spread sequence portion (101 in Fig. 1) and the cyclic redundancy (105 in Fig. 1, col. 2, lines 1-17), but does not particularly teach the step of forming is achieved by software. However, the use of software is well known in the art for at least the advantage of flexibility. Chen et al. teaches using software to implement an OFDM-CDMA system (abstract, page 76, right column, the last 6 lines). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use software to form the sequence of Lee for the advantage of flexibility.

Regarding claim 30, Lee teaches that the spreaders 101 spread the transmission signal using orthogonal codes and PN spreading sequences (col. 1, lines 40-43). Therefore, the spread sequence portion clearly reads on the claimed "a fraction of a spread sequence".

Regarding claim 33, the output of the summer 102 of Lee meets the claimed "baseband chip-level sequence".

15. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (U.S. Patent No. 6,373,861) in view of Chen et al. (IEEE paper, "A Programmable

Architecture for OFDM-CDMA”) as applied to claim 29 above, and further in view of Letaief et al. (U.S. Patent No. 5,960,032, “Letaief” hereinafter).

Lee in view of Chen et al. teaches the claimed subject matter, as applied to claim 29 above, but does not particularly indicate that the transmission data (TX data in Fig. 1) input to the spreaders (101 in Fig. 1) is from the same user (i.e., multicode CDMA). Letaief teaches a multicode modulation system (Fig. 1). The transmission data of a single user is divided a plurality of sub-block ( $b_k(t)$  in Fig. 1) and each sub-block is spread by a respective spreader. Letaief also teaches that the multicode modulation system has the advantage of ability to use interference cancellation as an effective technique for improving the overall system performance (col. 2, lines 8-10) and increase data rate (col. 2, lines 29-30, note that the advantage of high data rate is also admitted by the applicants, see page 1, lines 26-29 of the specification). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to divide the data of a single user to be the transmission data of Lee in view of Chen et al., so as to achieve the advantages identified above.

16. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (U.S. Patent No. 6,373,861) in view of Chen et al. (IEEE paper, “A Programmable Architecture for OFDM-CDMA”) as applied to claim 29 above, and further in view of Thomas et al. (U.S. Patent No. 6,826,240, “Thomas” hereinafter).

Lee in view of Chen et al. teaches the claimed subject matter, as applied to claim 29 above, but does not teach that the cyclic redundancy comprises zero value chips.

Art Unit: 2638

Thomas teaches zero-value, i.e., known value, cyclic redundancy to avoid inter-carrier interference caused by time-varying channels (col. 12, lines 16-23). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a known value (i.e., zero) cyclic redundancy so as to avoid interference.

17. Claims 44, 45, 59, 60, 72, and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thielecke et al. (U.S. Patent No. 5,719,899, "Thielecke" hereinafter) in view of Miao et al. (U.S. Patent No. 6,279,022, "Miao" hereinafter).

Regarding claims 44, 59 and 72, Thielecke teaches the claimed subject matter, as explained in the rationale applied to claims 42, 57 and 70 above, but does not teach the receive samples include cyclic redundancy. Miao teaches adding cyclic redundancy to reduce intersymbol interference and to determine symbol boundary (col. 2, lines 17-21). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate cyclic redundancy into the receive samples of Thielecke to reduce intersymbol interference and to determine symbol boundary.

Regarding claims 45, 60 and 73, Miao teaches converting the cyclic redundancy to frequency domain samples (130 in Fig. 1, col. 5, lines 44-46).

***Allowable Subject Matter***

18. Claim 48 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Prasad et al. ("An Overview of Multi-Carrier CDMA", IEEE paper 1996).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chieh M. Fan whose telephone number is (571) 272-3042. The examiner can normally be reached on Monday-Friday 8:00AM-5:30PM, Alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2638

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Chieh M Fan  
Primary Examiner  
Art Unit 2638

September 18, 2005